No. 7300060

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Cargill, Incorporated

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF seventeen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS REQUIRED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SAFFLOWER

'Cargill Dwarf 101'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington *this* twelfth *day of* December *in the year of our Lord one thousand nine hundred and* seventy-five

Attest:

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Secretary of Agriculture

Amended

FORM GR-470
(2-12-71)

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

FORM APPROVED
OMB NO. 40-R3712

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: *See Reverse.*

1. VARIETY NAME OR TEMPORARY DESIGNATION	2. KIND NAME	FOR OFFICIAL USE ONLY
CARGILL DWARF ~~SAFFLOWER~~ 101 (3-20-73)	SAFFLOWER	PVPO NUMBER 73060
3. GENUS AND SPECIES NAME	4. FAMILY NAME *(Botanical)*	FILING DATE 2-21-73 / TIME 12:00 P.M.
	COMPOSITAE	
CARTHAMUS TINCTORIUS	5. DATE OF DETERMINATION MAY 1970	FEE RECEIVED $ 750 / CHARGES

6. NAME OF APPLICANT(S)	7. ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*	8. TELEPHONE AREA CODE AND NUMBER
CARGILL, INCORPORATED	CARGILL BLDG. MINNEAPOLIS, MINNESOTA 55402	612-473-8811

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: *(Corporation, partnership, association, etc.)*	10. STATE OF INCORPORATION	11. DATE OF INCORPORATION
CORPORATION	DELAWARE	JULY 18, 1930

12. Name and mailing address of applicant representative(s), if any, to serve in this application and receive all papers:

DR. MARVIN W. FORMO
CARGILL INC.
CARGILL BLDG.
MINNEAPOLIS, MINNESOTA 55402
PH. 612-~~473-8811~~ 475 7373

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

- [X] 12A. Exhibit A, Origin and Breeding History of the Variety *(See Section 52, P.L. 91-577)*
- [X] 12B. Exhibit B, Botanical Description of the Variety
- [X] 12C. Exhibit C, Objective Description of the Variety
- [X] 12D. Exhibit D, Data Indicative of Novelty
- [X] 12E. Exhibit E, Statement of the Basis of Applicant's Ownership

The applicant declares that a viable sample of basic seed of this variety will be deposited upon request before issuance of a certificate and will be replenished periodically in accordance with such regulations as may be applicable. *(See Section 52, P.L. 91-577).*

14A. Does the applicant(s) specify that seed of this variety be sold by variety name only as a class of certified seed? *(See Section 83(a), P.L. 91-577) (If "Yes," answer 14B and 14C below.)* [X] YES [ ] NO

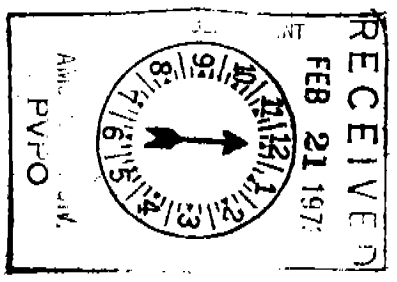
14B. Does the applicant(s) specify that this variety be limited as to number of generations?	14C. If "Yes," to 14B, how many generations of production beyond breeder seed?
[X] YES [ ] NO	THREE

Applicant is informed that false representation herein can jeopardize protection and result in penalties.

The undersigned applicant(s) of this sexually-reproduced novel plant variety believes that the variety is distinct, uniform, and stable as required in Section 41 and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act (P.L. 91-577).

FEBRUARY 16, 1973	Marvin W. Formo
(DATE)	(SIGNATURE OF APPLICANT)
(DATE)	(SIGNATURE OF APPLICANT)

FORM GR-470 (REVERSE)



INSTRUCTIONS

GENERAL: Send an original copy of the application, exhibits and $50.00 fee to U.S. Dept. of Agriculture, Consumer and Marketing Service, Grain Division, Hyattsville, Maryland 20782. Retain one copy for your files. All items on the face of the form are self-explanatory unles noted below.

ITEM

5 Insert the date the applicant determined that he had a new variety.

12a First, give the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method. Second, give the details of subsequent stages of selection and multiplication. Third, indicate the type and frequency of variants during reproduction and multiplication and state how these variants may be identified. Fourth, provide evidence on stability.

12b First, give any special characteristics of the seed and of the plant as it passes through the seedling stage, flowering stage and the fruiting stage. Second, describe the mature plant and compare it with a similar commercial variety grown under the same conditions, and indicate the differences.

12c A supplemental form will be furnished by the PVPO to describe in detail a variety for each kind of seed.

12d Provide complete data indicative of novelty. Seed and plant specimens may be submitted and seeds submitted may be sterile. Where possible, include photographs of plant comparisons, chemical tests, etc.

12e Indicate whether applicant is the actual breeder, the employer of the breeder, the owner through purchase or inheritance, etc.

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EXHIBIT A

Two single plants were selected in 1966 to be used as parents in 1967. Both plants produced seed that varied from almost hulless to grey-stripe. One plant was found in a grow-out of Composite "I", a U.S.D.A. release from Mesa, Arizona. The other was from U.C.-12, a composite released by the Agronomy Department-University of California, at Davis. These two plants were crossed in 1967 to determine if factors controlling their hull characters were the same in both plants. F_1 plants grown in 1968 were of normal height and all 23 plants produced seed varying in hull thickness on each plant.

Self seed from each of the 23 F_1 plants was planted in separate rows in 1969. One of these 23 F_2 progenies segregated for height, ten plants were 30-40 cm tall ($\bar{x}$ 35 cm) and 36 plants averaged 75 cm tall. All 46 plants were self pollenated and the ten short plants were crossed to normal height plants of the variety Gila.

The self seed from the ten short plants was planted in 1970 and produced only short plants 45 to 52.5 cm ($\bar{x}$ 50 cm). Seed from the thirty-six normal height plants in 1969 was planted in 1970. Twenty of these F_3 lines segregated again for height; with a total of 202 short-47 to 52 cm ($\bar{x}$ 51 cm) and 638 lines were uniformly normal for height ($\bar{x}$ 91 cm).

Based on this data this gene for short height is designated as "d" with the normal allele "D" having complete dominance.

Remnant self seed from 1969 short plants and self seed from all short plants in 1970 was planted in isolation in 1971. All rows were short, 51 to 70 cm ($\bar{x}$ 56 cm), orange flowered, spiny and grey stripe seed.

Two hundred single plants were harvested from the 1971 isolation and planted in 1972. The plants ranged from 53 to 70 cm tall ($\bar{x}$ 56 cm).

			$\bar{x}$	Range
1969	April 22	dwarf	37 cm	29-42
		Frio	82 cm	(not measured)
1970	April 1	dwarf	51 cm	45-54
		Frio	109 cm	
1971	April 15	dwarf	56 cm	53-58
		Frio	106 cm	
1972	March 20	dwarf	56 cm	52-58
		Frio	103 cm	

Any environmental conditions that varies the rate of growth in early stages greatly effects the final height of safflower. Cargill Dwarf appears to be no different in that respect. In general, earlier plantings give greater height because more time is devoted to vegetative growth.

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12 B EXHIBIT B

Botanical Description of Cargill Dwarf Safflower

Seedling growth is normal with branching occurring early in development. Flowers are orange. Fresh florets are yellow, drying to an orange color.

The mature plant is shorter than any other commercial variety or publicly released line grown under the same conditions. Gila is the shortest commercial variety, but the Cargill Dwarf averaged 36 cm shorter than Gila with 2 to 3 times as many heads.

The achenes (seeds) average 5.7 mm long by 2.0 mm wide. The hulls are grey-striped to almost hulless and all hull thicknesses are produced on each single plant.

The genotype and phenotype of Cargill Dwarf Safflower is as follows for those characteristics described in this application:

Character	Genotype	Phenotype
Height	dd	Dwarf
Spines	Sp Sp	Spiny
Hull	Stpg Stpg	Grey-Striped
Flower Color	YYCC OORR	Orange

FORM APPROVED. OMB NO. 40-R3712

FORM GR-470-22
(2-15-73)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

EXHIBIT C
(Safflower)

OBJECTIVE DESCRIPTION OF VARIETY

SAFFLOWER (*CARTHAMUS TINCTORIUS*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
CARGILL, INCORPORATED

ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)
Cargill Building
Minneapolis, Minnesota 55402

FOR OFFICIAL USE ONLY

PVPO NUMBER 73060

VARIETY NAME OR TEMPORARY DESIGNATION
Cargill Dwarf 101

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. MATURITY (From Emergence):

[1] Location: 1 = CALIFORNIA & ARIZONA 2 = MIDWEST

[1][1][2] NO. OF DAYS TO MATURITY

[0][8] NO. OF DAYS EARLIER THAN .... [1]
[ ][ ] NO. OF DAYS LATER THAN ..... [ ]
1 = GILA 2 = FRIO 3 = US-10

[2] Maturity Class: 1 = EARLY (less than 110 days) 2 = MEDIUM EARLY (110 to 120 days)
3 = MEDIUM LATE (121 to 130 days) 4 = LATE (more than 130 days)

2. PLANT HEIGHT AT MATURITY:

[0][5][0] CM. HEIGHT

[3][6] CM. SHORTER THAN ..... [1]
[ ][ ] CM. TALLER THAN ..... [ ]
1 = GILA 2 = FRIO 3 = US-10

3. FLOWER COLOR:

[0][6] Type:

	Fresh Flower	Wilted Flower
01 =	WHITE	GREYISH-WHITE
02 =	LIGHT YELLOW	GREYISH-WHITE
03 =	LIGHT-ORANGE BASE	ORANGE BASE
04 =	YELLOW	YELLOW (US-10)
05 =	YELLOW	LIGHT ORANGE BASE
06 =	YELLOW	ORANGE (Gila)
07 =	ORANGE	LIGHT RED
08 =	REDDISH ORANGE	DEEP RED
09 =	YELLOW BASE & TIPS OF LOBES ORANGE	ORANGE
10 =	PALE-YELLOW	PALE-YELLOW
11 =	OTHER (Specify)	

4. SPINES ON INVOLUCRAL BRACTS:

[2] 1 = ABSENT 2 = PRESENT

[3] Location: 1 = TIP ONLY 2 = TIP & FEW BASAL 3 = TIP & ALONG MARGINS 4 = MARGINS ONLY

[0][3] MM. LENGTH (A) [1][1] NUMBER (B) [0][3][3] SPINE INDEX (A x B)

[2] Spine Index Class: 1 = 0–20 2 = 21–40 3 = 41–60 4 = 61–80 5 = 81–100 6 = 101–120

5. HEADS (For Plant Populations of 593,000 Plants/Hectare):

[0][2][0] MM. DIAMETER (Primary Heads)

[1] Seed Shattering Percentage: 1 = 1–10 2 = 11–30 3 = OVER 30

6. SEED:

[5] Color: 1 = WHITE 2 = CREAM 3 = GRAY 4 = GRAY WITH WHITE TIP
5 = GRAY STRIPED 6 = PURPLE STRIPED 7 = BROWN STRIPED 8 = BROWN BLOTCH
9 = OTHER (Specify) _____

[3] Hull Type: 1 = NORMAL 2 = THIN-HULLED 3 = STRIPED 4 = REDUCED

[0][2] MM. WIDTH [0][6] MM. LENGTH [0][3][1] GRAMS PER 1000 SEED

7. SEEDLING VIGOR: (6 weeks after seeding at 2.5 cm. depth with ample moisture for germination; mean of 20 plants)

[1][0] NUMBER OF NODES [0][0][9] CM. TALL (Soil Surface to Tip)

FRIO 10 024

CARGILL DWARF 101
7300060

FORM GR-470-22 (REVERSE)

8. COLD RESISTANCE AT DIFFERENT STAGES AND TEMPERATURES:

2	Rosette:	1 = −10° C. 2 = −6° C. 3 = 0° C. 4 = 5° C. 5 = 10° C.
3	Bolting:	
4	Flowering:	

9. DISEASE: (0 = Not Tested; 1 = Susceptible; 2 = Resistant)

2	RUST (Specify races) Seedling phase Puccinia carthami	1	PHYTOPHTHORA ROOT ROT	0	PYTHIUM ROOT ROT
1	FUSARIUM WILT	0	VERTICILLIUM WILT	0	CERCOSPORA LEAF SPOT
0	SCLEROTINA STEM ROT	0	ALTERNARIA LEAF SPOT	0	ALTERNARIA BUD ROT
1	BOTRYTIS HEAD ROT	0	RHIZOCTONIA BLIGHT	0	BACTERIAL BLIGHT
0	CUCUMBER MOSAIC	0	PHYLLODY		OTHER (Specify)

10. INSECT AND NEMATODE: (0 = Not Tested; 1 = Susceptible; 2 = Resistant)

0	GREEN PEACH APHID	0	LEAF-CURL PLUM APHID	0	BLACK BEAN APHID
~~0~~	WESTERN FLOWER THRIPS	~~0~~	LYGUS BUGS	0	STINKBUGS
0	ROOT-KNOT NEMATODE		OTHER (Specify)		

11. INDICATE A VARIETY THAT MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	VARIETY	CHARACTER	VARIETY
Frost Hardiness		Lodging	
Seed Shattering	Gila	No. of Branches	Pacific-7
Seedling Vigor	FRIO		

12. GIVE THE FOLLOWING DATA FOR SUBMITTED AND A SIMILAR VARIETY *:

VARIETY Letter Jan 4, 1974:	HULL (%)	PROTEIN (%) 10% MB	OIL (%) 10% M.B	IODINE (%)	ACIDS SATURATED (%)	ACIDS UNSATURATED OLEIC (%)	ACIDS UNSATURATED LINOLEIC (%)
Submitted	28.9	31.7 33.1	40.9 42.9	145.1	8.4	14.5	77.1
Similar	31.6	33.0 34.4	38.0 39.6	143.1	8.1	13.6	78.3
Name of Similar Variety	Frio	Frio	Frio	Frio	Frio	Frio	Frio

**Hull, protein, and oil percentages expressed for whole undecorticated seed; acids expressed as percentages of oil.*

REFERENCES

1. Knowles, P.F. & M.D. Miller. 1965. Safflower. Cal. Ag. Exp. Sta. Circ. 532. 51 p.
2. Weiss, E.A. 1971. Castor, Sesame, and Safflower. Barnes & Noble, Inc. N.Y. 901 p.

Nickerson's or any recognized color fan may be used to determine plant colors of described variety.

COMMENTS:

Actual values:

Dwarf 101	Protein, 33.1%	Oil, 42.7%	Moisture, 6.1 %
Frio	34.4	39.6	6.3

Additions made 12/16/74 submitted with letter of 12/11/74

The commercial variety that is most like Cargill Dwarf 101 overall characters is Frio.

Frio's branching is much like Dwarf 101 with many branches starting from near or at the soil surface. Dwarf 101's branches are stronger than Frio's and more of them will terminate with heads. The hull content of Dwarf 101 is less than Frio's but both have the grey-stripe character. Dwarf 101 has orange flowers (fresh florets are yellow drying orange) and Frio has yellow flowers (fresh florets yellow drying yellow). Both Frio and Dwarf 101 are spiny.

Character	Dwarf 101	Frio
Height	Dwarf	Normal
Spines	Spiny	Spiny
Hull	grey-stripe	grey-stripe
Flower Color	Orange	Yellow
Branching	Strong from base	Weak from base
Hull %	28.9	31.6
Protein % (10% MB)	31.7	33.0
Oil % (10% MB)	40.9	38.0
Iodine Value	145.1	143.1
Saturated Acids %	8.4	8.1
Unsaturated Acids		
Oleic %	14.5	13.6
Linoleic %	77.1	78.3

GROWTH COMPARISON

Date Planted 1974	Variety		3 April 66 height cm	Nodes No.	Calc cm/ node	5 June height cm	Nodes No.	Calc cm/ node
27 Feb	Dwarf 101	range	17-25	12-15		54-67	24-25	
		mean	20	14	1.4	60	25	2.4
27 Feb	Frio	range	25-34	15-17		78-87	23-27	
		mean	32.5	16	2.0	85	26	3.4
19 March	Dwarf 101	range	6-10	8-10		45-53	20-23	
		mean	8.75	9.5	0.9	52.5	21	2.5
19 March	Frio	range	11-21	8-11		69-78	18-21	
		mean	16.25	10	1.6	72.5	20	3.6

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EXHIBIT E

STATEMENT OF THE BASIS OF CARGILL, INCORPORATED'S OWNERSHIP OF DWARF 101

Cargill, Incorporated, selected, tested, developed and increased from germplasm material received in 1967 from the U.S.D.A., a release Composite "I" from Mesa, Arizona and U.C.-12, a composite released by the Agronomy Department, University of California at Davis, California.

This germplasm was made available to Cargill to use without any restrictions.